



NASA Engineering and Safety Center (NESC)





NESC Background and Vision



Apollo Saturn V Launch Vehicle

- NESC was established in July 2003 in response to the Columbia accident
- Safety philosophy has 3 tenets:
 - Strong in-line checks and balances
 - Healthy tension
 - “Value added” independent assessment
- NESC provides independent assessment of technical issues for NASA programs and projects

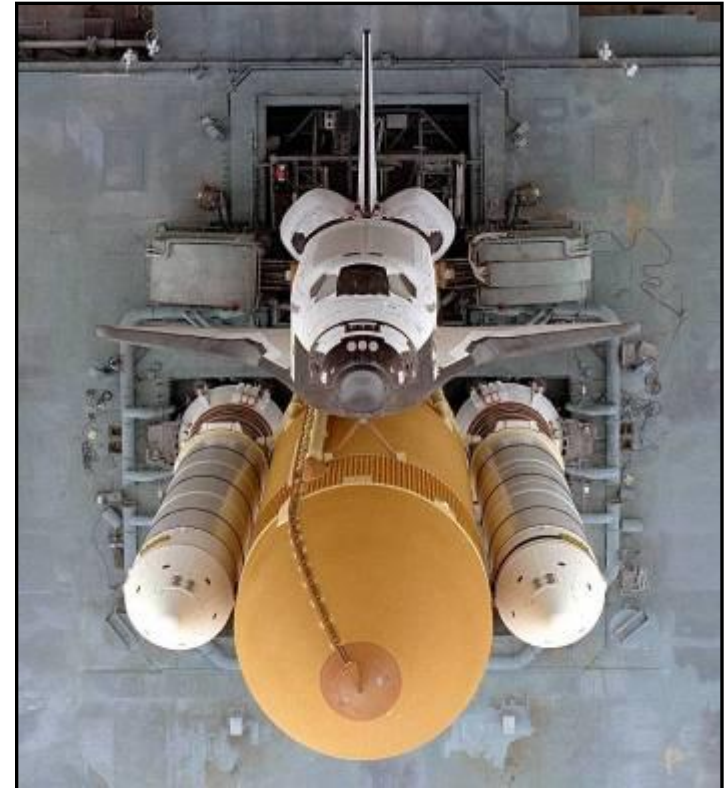
NESC is cultivating a Safety culture focused on **engineering and technical excellence**, while fostering an **open environment** and attacking challenges with **unequalled tenacity**



NESC Model



- Institutionalized “Tiger Team” approach to solving problems
- Agency-recognized NASA Technical Fellows lead Technical Discipline Teams (TDT)
 - TDTs include “ready” experts from across NASA, industry, academia and other government agencies
- Assemble diverse, expert technical teams that provide robust technical solutions to the Agency’s highest-risk and most complex issues
- Strong Systems Engineering function for proactive trending and identification of problem areas before failures occur

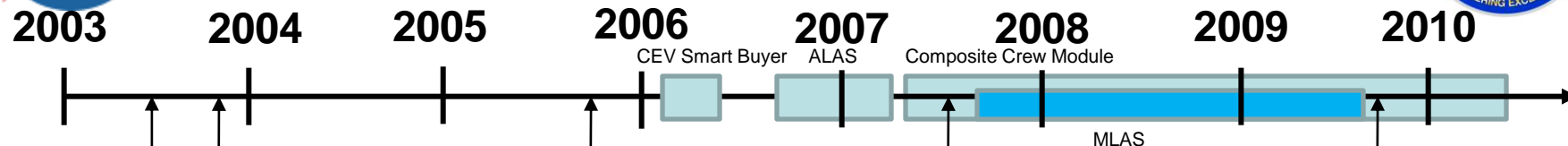


Space Shuttle on Mobile Launch Platform

Focus on technical rigor and engineering excellence



NESC Timeline



July 2003
NESC Created

November 2003
Operational

October 2005
100th Technical Assessment
Initiated

June 2007
200th Technical Assessment
Initiated

September 2009
300th Technical Assessment
Initiated



NESC Leadership Team

The NASA Engineering and Safety Center (NESC) provides a strong technical team to coordinate and conduct robust, independent engineering and safety assessments across the Agency.

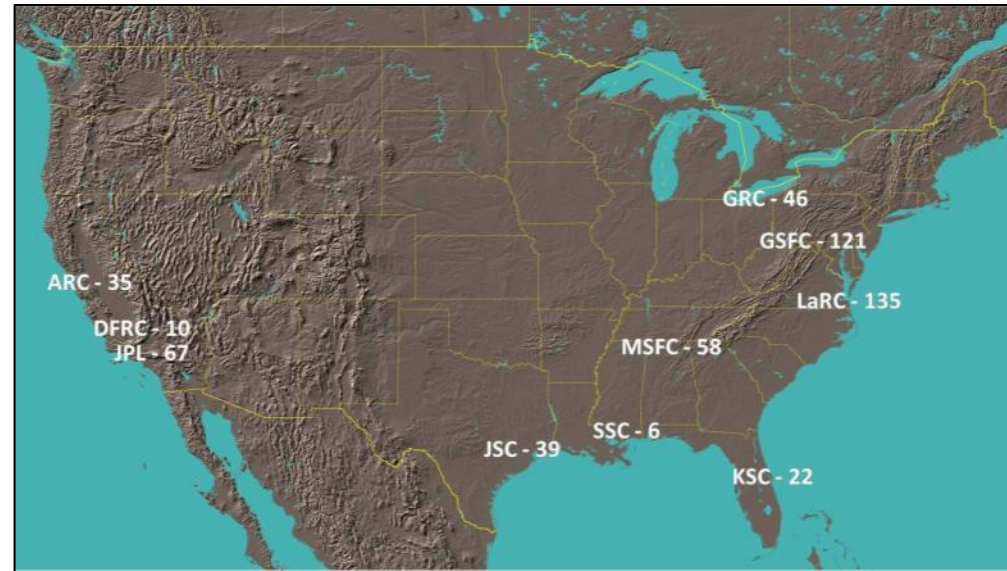


NESC Organization

Distributed NESC Team



- NESC has 61 full-time employees selected from across the Agency and externally
- NESC Chief Engineers at each Center provide technical insight and liaison roles
- 15 NASA Technical Fellows are recognized experts in their respective engineering fields
- 18 Technical Discipline Teams (TDT) comprised of 16 engineering and 2 operations disciplines create a network of over 700 engineers available for matrix support
- More than 200 TDT members are drawn from industry, academia and other government agencies



NASA Personnel Providing Matrix Support to the NESC

Over 700 top caliber engineers support the NESC nationwide



NASA Technical Fellows Disciplines



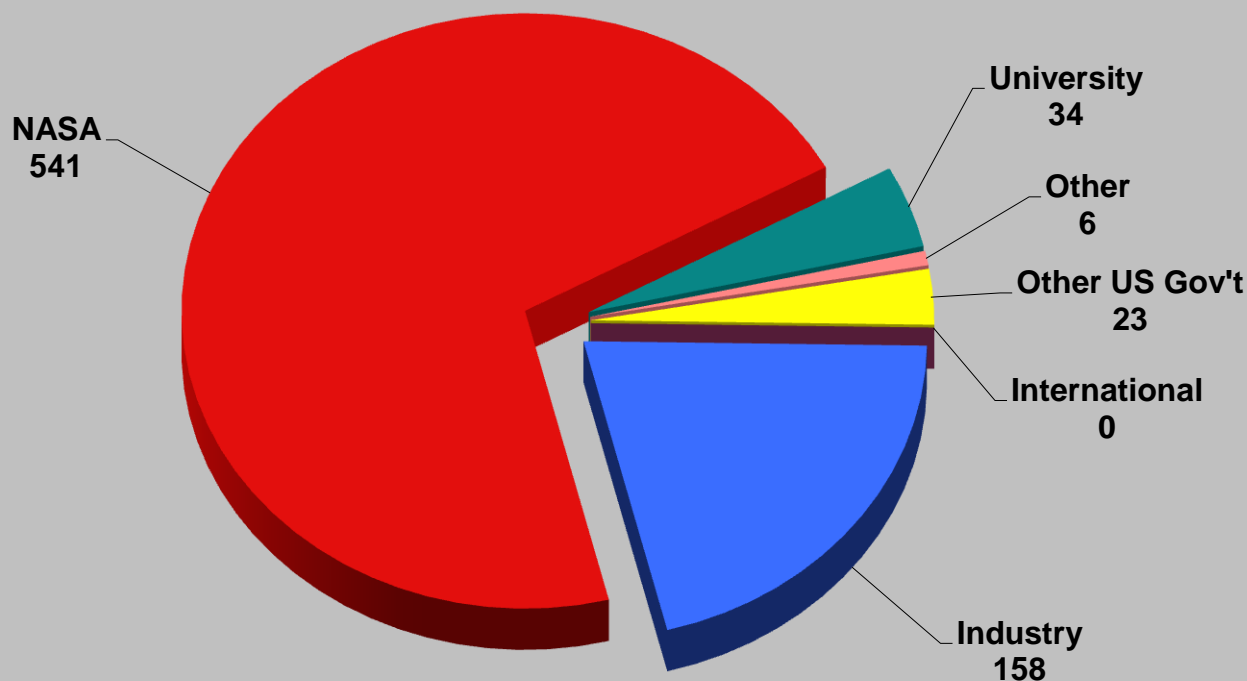
- 15 NASA Technical Fellows are currently active
 - Aerosciences - Dave Schuster (LaRC)
 - Avionics - Oscar Gonzalez (GSFC)
 - Electrical Power – Denney Keys (GSFC)
 - Flight Mechanics – Dan Murri (LaRC)
 - Guidance, Navigation, and Control - Neil Dennehy (GSFC)
 - Human Factors - Cynthia Null (ARC)
 - Life Support / Active Thermal - Hank Rotter (JSC)
 - Loads and Dynamics - Curt Larsen (JSC)
 - Materials - Bob Piascik (LaRC)
 - Mechanical Systems – Joe Pellicciotti (GSFC)
 - Non-Destructive Evaluation - Bill Prosser (LaRC)
 - Passive Thermal – Steve Rickman (JSC)
 - Propulsion – Roberto Garcia (MSFC)
 - Software - Mike Aguilar (GSFC)
 - Structures - Ivatury Raju (LaRC)
- Four additional disciplines to be added pending available funding
 - Space Environments
 - Systems Engineering
 - Cryogenics
 - Instruments and Sensors



Composition of NESC's Extended Network of Experts



Technical Discipline Team Participation



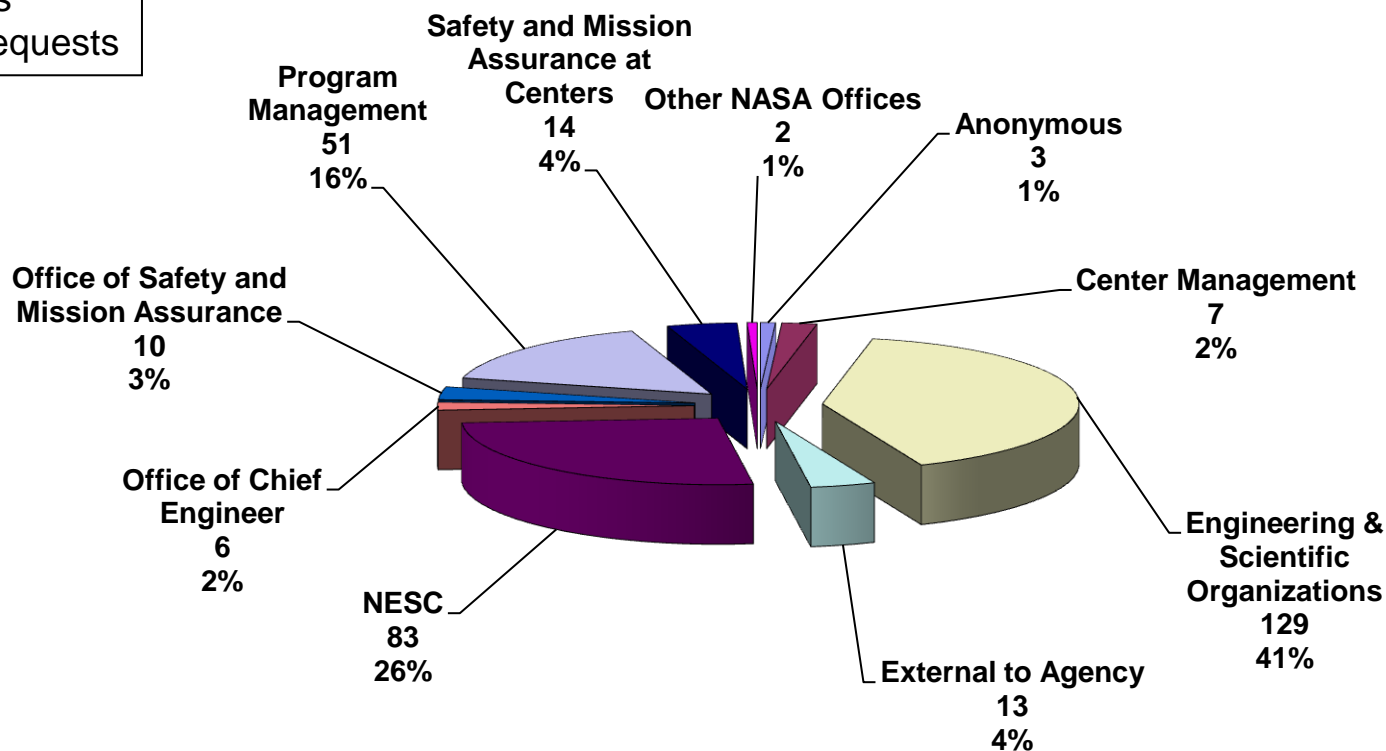
Total TDT Membership = 762
as of August 2009



Accepted Requests by Source (Cumulative)

Key

- Source of Request
- # of Requests
- Percent of Requests



**Total Accepted
Requests = 318**

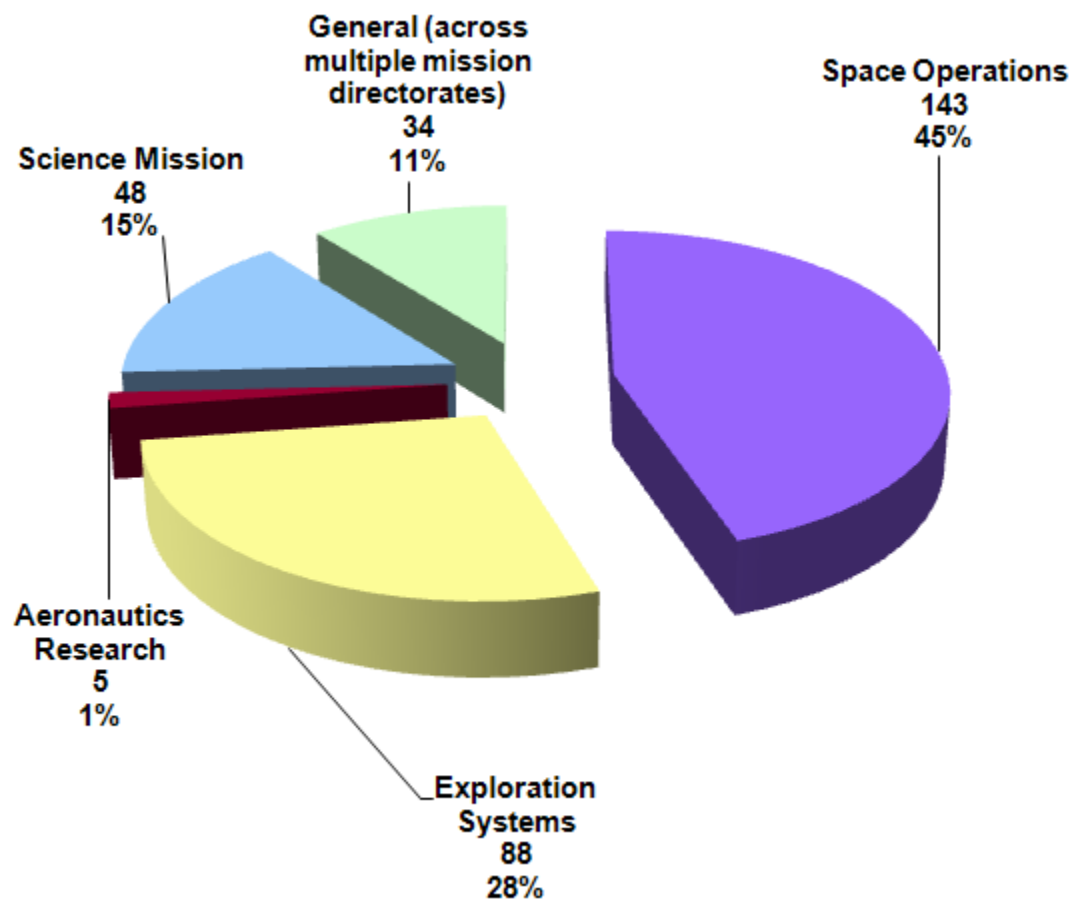
Data as of September 8, 2009



Accepted Requests by Mission Directorate (Cumulative)



**Total Accepted
Requests = 318**



Key

- Mission Directorate
- # of Requests
- Percent of Requests

Data as of September 8, 2009



NESC Technical Highlights 2009

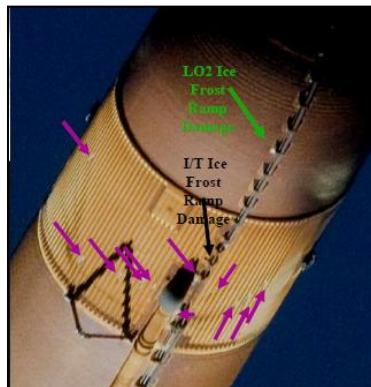
Space Operations



ISS Radiator Face Sheet Damage



Space Shuttle External Tank Foam Loss



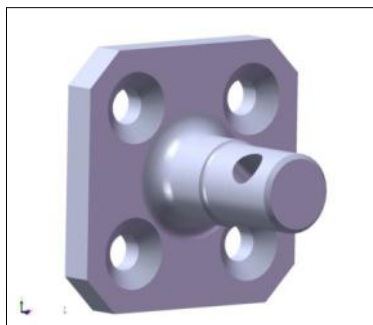
ISS Solar Array Joint Degradation



ISS Solar Array Mast Buckling Test



Space Shuttle Reaction Control System Stinger Attach Point



Space Shuttle Orbiter Flow Control Valve Cracks



Space Shuttle Orbiter Reinforced Carbon Carbon Testing



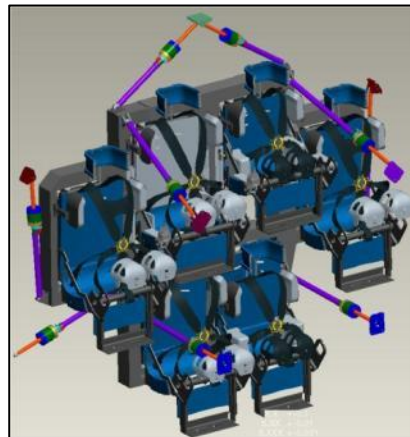


NESC Technical Highlights 2009

Exploration



Crew Exploration Vehicle (CEV) Seat Attenuation and Occupant Protection



**Shell Buckling Knockdown
Factor Testing**



**Composite Overwrapped
Pressure Vessel Subscale
Testing**

Ares I-X Rollout Stabilization And Structural Peer Review

Ares I-X

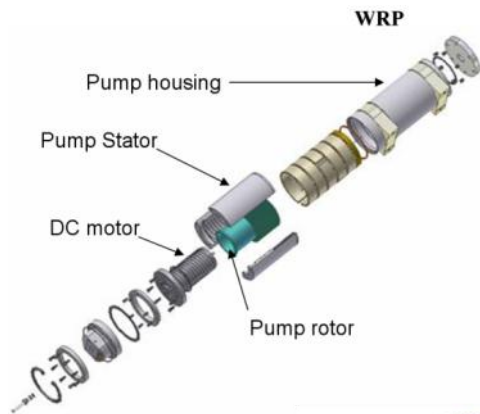




NESC Technical Highlights 2009 Science



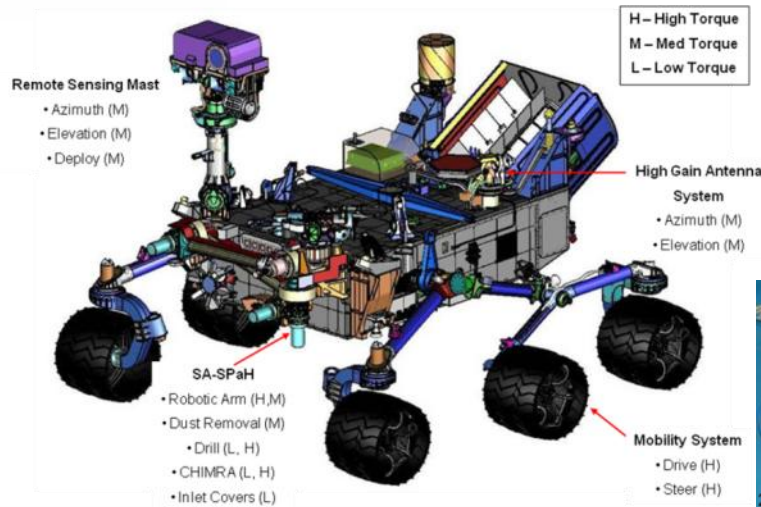
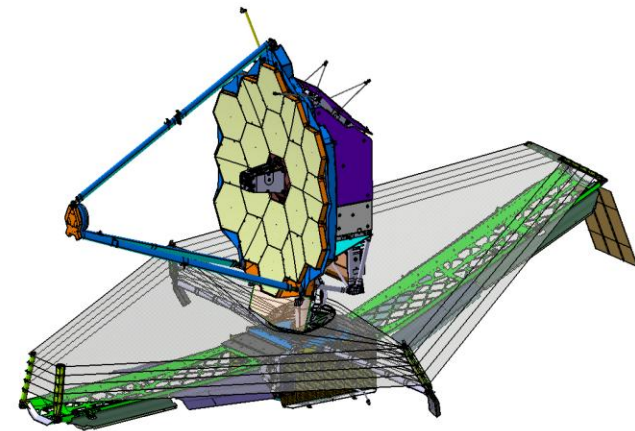
Mars Science Lab (MSL) Wide Range Pump (WRP) Design issues



Entry, Descent, and Landing Data Repository and Analyses



JWST Sunshield Venting Analysis

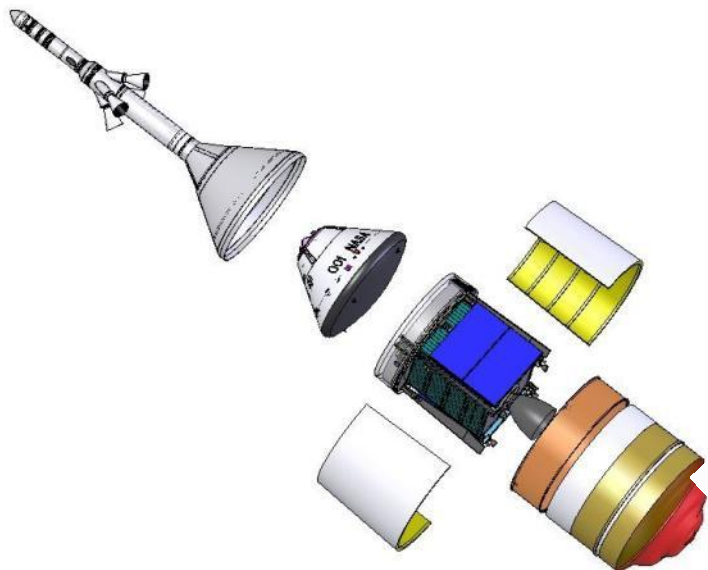


Mars Science Lab (MSL) Actuator Anomaly





NESC Leading Agency-Wide Teams Gaining Hands-On Experience In Design, Development, and Test



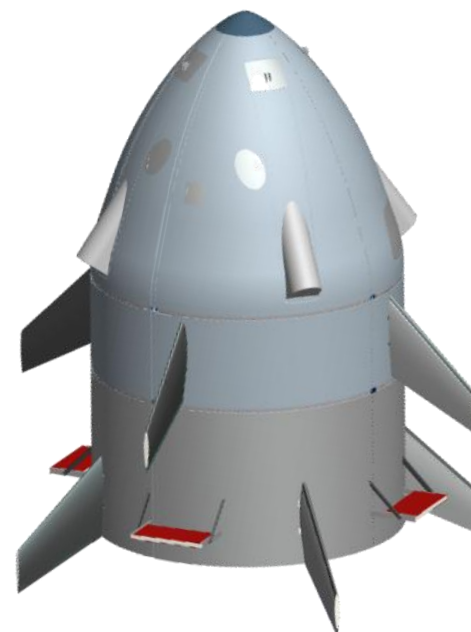
CEV Smart Buyer



Composite Crew Module



Alternate Launch Abort System



Max Launch Abort System



NESC Leading Agency-Wide Teams Max Launch Abort System



Develop an alternate launch abort system design as risk mitigation for the Orion LAS and demonstrate the concept with a pad abort flight test.

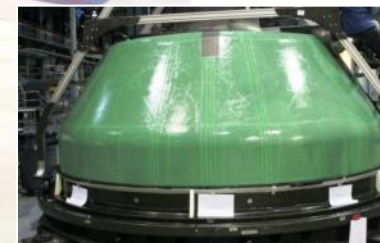
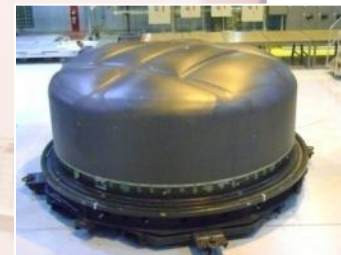
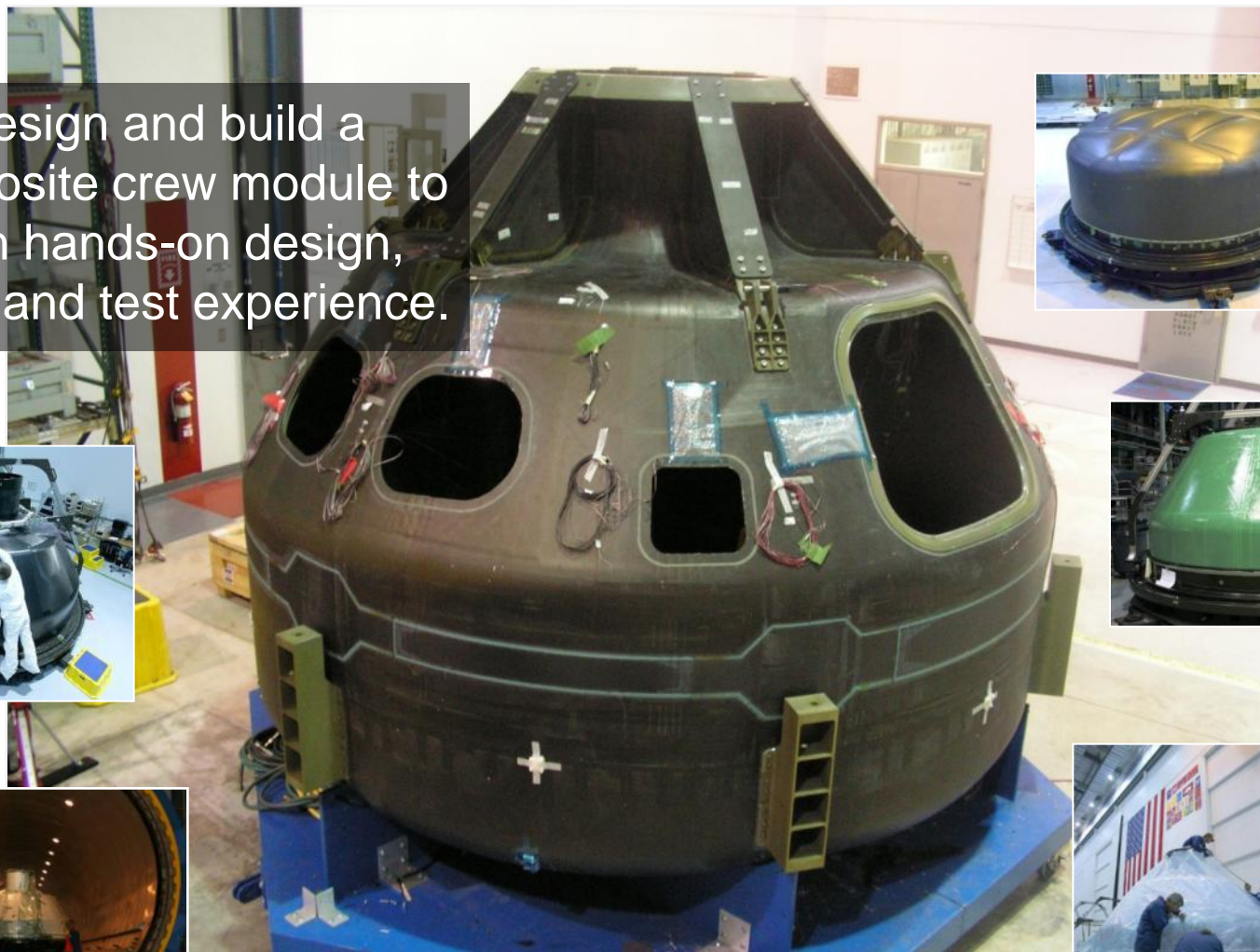




NESC Leading Agency-Wide Teams Composite Crew Module



Design and build a composite crew module to gain hands-on design, build, and test experience.





Contributions to Mission Success



- After 6 years and 300+ technical assessments the NESC has become the “value added” independent technical organization for the Agency
- The NESC model provides an excellent example of the benefits of bringing together diverse technical experts to solve the Agency’s most difficult problems
 - Creative, robust technical solutions
 - Stronger checks and balances
 - Well informed decision making
- The NESC has fulfilled a role for off-line design, development and test to provide alternate solutions, gain valuable hands-on experience and help train the next generation of engineers

